REMARKS

Claims 1-25 are pending and under consideration. In the Final Office Action of February 23, 2006, the Examiner made the following disposition:

A.) Rejected claims 1, 3, 14, and 16 under 35 U.S.C. §102(b) as allegedly being anticipated by *Kon, et al.*

B.) Rejected claims 4 and 20 under 35 U.S.C. §102(b) as allegedly being anticipated by *Tsang, et al.*

C.) Rejected claim 10 under 35 U.S.C. §102(e) as allegedly being anticipated by *Uya, et al.*

D.) Rejected claims 2 and 15 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Kon, et al.* in view of *Merrill.*

E.) Rejected claims 5 and 21 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Merrill.*

F.) Rejected claims 6 and 22 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Matsumoto.*

G.) Rejected claims 7-9 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Nakagawa.*

H.) Rejected claims 11-13 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Uya, et al.* in view of *Nakagawa.*

I.) Rejected claim 17 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Kon, et al.* in view of *Isogai, et al.*

J.) Rejected claim 18 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Kon, et al.* in view of *Suzuki.*

K.) Rejected claim 23 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Isogai, et al.*

L.) Rejected claim 24 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Suzuki.*

M.) Objected to claims 19 and 25.

Applicants respectfully traverse the rejections and address the Examiners disposition below.

A.) Rejection of claims 1, 3, 14, and 16 under 35 U.S.C. §102(b) as allegedly being anticipated by *Kon, et al.*:

Applicants respectfully disagree with the rejection.

Independent claims 1 and 14 each claim subject matter relating to transferring electrons accumulated in a photodiode to a detection portion. The gate voltage of a transfer transistor when the electrons are accumulated in the photodiode is set to a negative voltage.

This is clearly unlike *Kon*. To begin with, *Kon* fails to disclose or suggest accumulating electrons in its photodiode and transferring the electrons to a detection portion. Instead, *Kon* merely teaches accumulating charges and transferring the charges. *Kon* states that "[w]hen a predetermined storing period has elapsed . . . the charge is transferred to CCD 2." *Kon* 5:52-56. Nowhere does *Kon* suggest accumulating and transferring electrons. For at least this reason, *Kon* fails to disclose or suggest claims 1 and 14.

Further, *Kon* fails to disclose or suggest a gate voltage of a transfer transistor when electrons are accumulated in a photodiode that is set to a negative voltage. Instead, *Kon* merely states that its voltages are increased or decreased relative to one another and in response to light rays incident on its image sensor. *Kon* 6:14-40. However, nowhere does *Kon* suggest that the gate voltage of its transfer transistor is set to a negative voltage when electrons are accumulated. *Kon* simply fails to even mention a negative voltage. Thus, for at least this additional reason, *Kon* fails to disclose or suggest claims 1 and 14.

Claims 3 and 16 depend directly or indirectly from claim 1 or 14 and are therefore allowable for at least the same reasons that claims 1 and 14 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

B.) Rejection of claims 4 and 20 under 35 U.S.C. §102(b) as allegedly being anticipated by *Tsang, et al.*:

Applicants respectfully disagree with the rejection.

Independent claims 4 and 20 have each been amended to include subject matter relating to holes overflowing from the photodiode being discharged to both the substrate side and the detection portion side through a lower side of a channel portion of the transfer transistor. As acknowledged by the Examiner this is patentable subject matter.

Therefore, claims 4 and 20, each as amended, are allowable over *Tsang*.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

C.) Rejection of claim 10 under 35 U.S.C. §102(e) as allegedly being anticipated by *Uya, et al.*:

Applicants respectfully disagree with the rejection.

Referring to Applicants' Figure 7 for illustrative purposes, independent claim 10 claims a solid-state image pickup device including pixels each of which comprises a photodiode, a detection portion and a transfer transistor for transferring charges accumulated in the photodiode to the detection portion. An overflow path for discharging charges overflowing from the photodiode is formed in a bulk out of a channel portion 54 of the transfer transistor and discharges the charges in a depth direction of a substrate.

This is clearly unlike *Uya*, which fails to disclose or suggest an overflow path for discharging charges overflowing from a photodiode that is formed in a bulk out of a channel portion of a transfer transistor and that discharges the charges in a depth direction of a substrate. Referring to *Uya* Figure 2, *Uya* fails to disclose an overflow path that is formed in a bulk out of a channel portion of a transfer transistor. In fact, *Uya* fails to disclose or suggest a bulk out of the channel portion of its transfer transistor. Therefore, for at least this reason, *Uya* fails to disclose or suggest claim 10.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

D.) Rejection of claims 2 and 15 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Kon, et al.* in view of *Merrill*:

Applicants respectfully disagree with the rejection.

Independent claims 1 and 14 are allowable over *Kon* as discussed above. *Merrill* still fails to disclose or suggest accumulating electrons in its photodiode and transferring the electrons to a detection portion. Therefore, *Kon* in view of *Merrill* still fails to disclose or suggest claims 1 and 14.

Claims 2 and 15 depend directly or indirectly from claim 1 or 14 and are therefore allowable for at least the same reasons that claims 1 and 14 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

E.) Rejection of claims 5 and 21 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Merrill*:

Applicants respectfully disagree with the rejection.

Independent claims 4 and 20 are allowable over *Tsang* as discussed above. *Merrill* still fails to disclose or suggest subject matter relating to holes overflowing from a photodiode being discharged to both the substrate side and the detection portion side through a lower side of a channel portion of a transfer transistor. Therefore, *Tsang* in view of *Merrill* still fails to disclose or suggest claims 4 and 20.

Claims 5 and 21 depend directly or indirectly from claim 4 or 20 and are therefore allowable for at least the same reasons that claims 4 and 20 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

F.) Rejection of claims 6 and 22 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Matsumoto*:

Applicants respectfully disagree with the rejection.

Independent claims 4 and 20 are allowable over *Tsang* as discussed above. *Matsumoto* still fails to disclose or suggest subject matter relating to holes overflowing from a photodiode being discharged to both the substrate side and the detection portion side through a lower side of a channel portion of a transfer transistor. Therefore, *Tsang* in view of *Matsumoto* still fails to disclose or suggest claims 4 and 20.

Claims 6 and 22 depend directly or indirectly from claim 4 or 20 and are therefore allowable for at least the same reasons that claims 4 and 20 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

G.) Rejection of claims 7-9 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Nakagawa*:

Applicants respectfully disagree with the rejection.

Independent claim 4 is allowable over *Tsang* as discussed above. *Nakagawa* still fails to disclose or suggest subject matter relating to holes overflowing from a photodiode being discharged to both the substrate side and the detection portion side through a lower side of a

channel portion of a transfer transistor. Therefore, *Tsang* in view of *Nakagawa* still fails to disclose or suggest claim 4.

Independent claim 1 claims subject matter relating to transferring electrons accumulated in a photodiode to a detection portion. The gate voltage of a transfer transistor when the electrons are accumulated in the photodiode is set to a negative voltage. *Tsang* and *Nakagawa*, taken singly or in combination, fails to disclose or suggest that the gate voltage of a transfer transistor is set to a negative voltage when electrons are accumulated in a photodiode. Therefore, *Tsang* in view of *Nakagawa* fails to disclose or suggest claim 1.

Claims 7-9 depend directly or indirectly from claims 1 or 4 and are therefore allowable for at least the same reasons that claims 1 and 4 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

H.) Rejection of claims 11-13 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Uya, et al.* in view of *Nakagawa*:

Applicants respectfully disagree with the rejection.

Independent claim 10 is allowable over *Uya* as discussed above. *Nakagawa* still fails to disclose or suggest an overflow path for discharging charges overflowing from a photodiode that is formed in a bulk out of a channel portion of a transfer transistor and that discharges the charges in a depth direction of a substrate. Therefore, *Uya* in view of *Nakagawa* still fails to disclose or suggest claim 10.

Claims 11-13 depend directly or indirectly from claim 10 and are therefore allowable for at least the same reasons that claim 10 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

I.) Rejection of claim 17 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Kon, et al.* in view of *Isogai, et al.*:

Applicants respectfully disagree with the rejection.

Independent claim 14 is allowable over *Kon* as discussed above. *Isogai* still fails to disclose or suggest accumulating electrons in its photodiode and transferring the electrons to a detection portion. Therefore, *Kon* in view of *Isogai* still fails to disclose or suggest claim 14.

Claim 17 depends directly or indirectly from claim 14 and is therefore allowable for at least the same reasons that claim 14 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

J.) Rejection of claim 18 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Kon, et al.* in view of *Suzuki*:

Applicants respectfully disagree with the rejection.

Independent claim 14 is allowable over *Kon* as discussed above. *Suzuki* still fails to disclose or suggest accumulating electrons in its photodiode and transferring the electrons to a detection portion. Therefore, *Kon* in view of *Suzuki* still fails to disclose or suggest claim 14.

Claim 18 depends directly or indirectly from claim 14 and is therefore allowable for at least the same reasons that claim 14 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

K.) Rejection of claim 23 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Isogai, et al.*:

Applicants respectfully disagree with the rejection.

Independent claim 20 is allowable over *Tsang* as discussed above. *Isogai* still fails to disclose or suggest subject matter relating to holes overflowing from a photodiode being discharged to both the substrate side and the detection portion side through a lower side of a channel portion of a transfer transistor. Therefore, *Tsang* in view of *Isogai* still fails to disclose or suggest claim 20.

Claim 23 depends directly or indirectly from claim 20 and is therefore allowable for at least the same reasons that claim 20 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

L.) Rejection of claim 24 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Tsang, et al.* in view of *Suzuki*:

Applicants respectfully disagree with the rejection.

Independent claim 20 is allowable over *Tsang* as discussed above. *Suzuki* still fails to disclose or suggest subject matter relating to holes overflowing from a photodiode being discharged to both the substrate side and the detection portion side through a lower side of a channel portion of a transfer transistor. Therefore, *Tsang* in view of *Suzuki* still fails to disclose or suggest claim 20.

Claim 24 depends directly or indirectly from claim 20 and is therefore allowable for at least the same reasons that claim 20 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

M.) Objection to claims 19 and 25:

Applicants respectfully acknowledge the Examiner's finding of allowable subject matter in claims 19 and 25.

Independent claim 14 is allowable as discussed above. Claim 19 depends directly or indirectly from claim 14 and is therefore allowable for at least the same reasons that claim 14 is allowable.

Claim 25 has been canceled.

Applicants respectfully submit the objection has been overcome and request that it be withdrawn.

CONCLUSION

It is submitted that claims 1-24 are patentable and that the application is in condition for allowance. Notice to that effect is requested.

Respectfully submitted,

(Reg. No. 45,034)

Christopher P. Rauch
SONNENSCHEIN NATH & ROSENTHAL LLP
P. O. Box 061080
Wacker Drive Station - Sears Tower
Chicago, Illinois 60606-1080
Telephone (312) 876 8000
Customer No. 26263